CSIR NEWS

A FORTNIGHTLY HOUSE BULLETIN OF CSIR

VOL. 27 15 OCTOBER 1977 NO. 19

Information Service

31 AUG

C.F.T.R.I., MYSORE

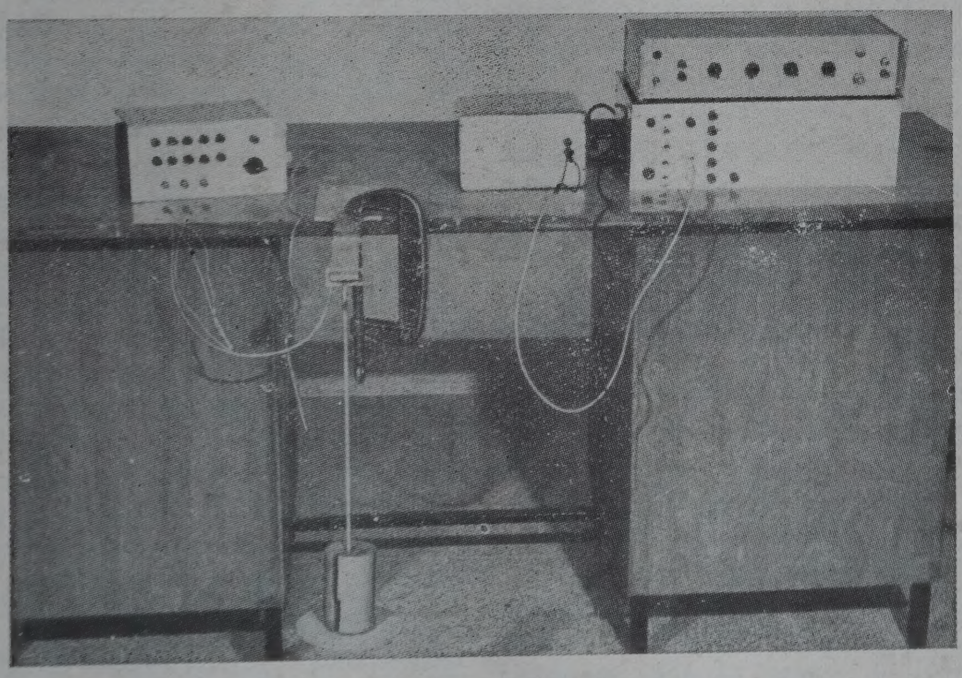
NAL Develops PCM Telemetry System

A pulse-code modulated (PCM) telemetry system for earth boundary layer measurements has been designed and developed by the National Aeronautical Laboratory (NAL), Bangalore. The system basically comprises a pulse-code modulated transmitter, a receiver and associated interface units.

The PCM transmitter is employed to telemeter physical parameters such as wind velocity, wind pressure, atmospheric temperature and humidity from a mast or any such remote location to a ground station. The receiver installed at the ground station receives these data in a coded format, processes them and prints them on a teleprinter in a suitable format.

The PCM transmitter consists of an analog multiplexer to sample the transducer data sequentially at a suitable rate, an analog-to-digital converter (ADC) to convert each of these samples into a digital form and a parallel-to-serial converter to serialize the parallel input from the ADC unit. The serialized output is transmitted to the ground station, bit by bit using PCM/FM techniques.

The receiver in the ground station is basically a frequency modulated (FM) receiver in which the coded signals received from the PCM transmitter are demodulated. The raw output of FM receiver is then fed to a processor which brings it to a suitable form for interfacing it with a magnetic tape, a cassette or a teleprinter. The processor consists of a bit synchronizer to bring the PCM receiver signals into synchronism with that of the transmitter, a dumped integrator which reconstructs the raw output waveform of FM receiver using matched filter techniques, and a frame synchronizer which identifies the beginning and end of a frame in the serial data.



PCM telemetry system developed at NAL, Bangalore

The specifications of the PCM telemetry system developed by NAL are:

Number of channels	:	8 (including one channel for frame synchronization)
Number of bits per channel	:	8 (BCD)
Bit rate	:	1000 bits/sec
Mode of signal	:	NRZ
Mode of transmission	:	PCM/FM
Transmission frequency	:	to be chosen
Accuracy	:	1%
Range	:	depends on transmitter power

Hydraulic Prop for Use in Mines

The Central Mining Research Station (CMRS), Dhanbad, has designed and developed two types of hydraulic props for use as mine roof support. One is of closed circuit type and the other is of open circuit type. Both the designs are being commercially exploited by Usha Telehoist Ltd, Calcutta. The closed circuit type is also being exploited by Mashstro (India) Pvt. Ltd, Calcutta.

Against the background of the large-scale programme of mechanization and modernization of Indian coalmines, this is a significant development, because the basic concept to achieve increased production target is towards increase in the number of longwall faces applying different technologies of mechanization with individual and self-advancing support, and coal getting and loading machines. For such props, the mining industry had to depend so far on imports.

Some of the components are common to both types and these have been standardized to avoid multiplicity of stores and to minimize wastage in switching over from one type to another. The props have some special features which make them more convenient to use underground compared to many other such props.

Mini Rice Mill

Paddy production in the country is around 60 million tonnes per year. A major portion of the paddy produced in the country is being processed in about 60,000 huller mills distributed mostly in rice-producing regions.

The huller mills are low capacity mills which can handle about 300-500 kg of paddy per hour. Both the shelling and polishing operations are carried out simultaneously in these mills, resulting in very highly polished white rice and low yield. The husk also gets powdered along with the bran, thus rendering the bran uneconomical for the extraction of oil.

Mini rice mill developed and fabricated at the Central Food Technological Research Institute (CFTRI), Mysore, is an improvement over the huller mills. It has higher functional efficiency than that of modern type rice mills of improved designs. In this mill, shelling and polishing operations are carried out separately, severity of milling treatment is reduced considerably, and strict control on the yield of head rice and degree of polish is achieved. The mill is compact and does not require skilled workers to operate it. It is intended basically for use in villages.

CFTRI has so far supplied blue prints and fabrication details to eight engineering units in the country. One of the units has already fabricated a few mini rice mills for effecting supplies. These mills were tested at the premises of the unit by CFTRI scientists for their performance, and the yield of head rice was found to be 70%. The rice obtained from these mills is free from dust, stones and brokens, and is expected to have a better market at a better price than the rice obtained from conventional type rice mills.

BTRA's Achievements Highlighted at Annual General Meeting

At the twenty-third annual general meeting of the Bombay Textile Research Association (BTRA), Bombay, held on 30 July 1977, Shri Radhakrishna R. Ruia, Chairman of BTRA, said that the Association had been playing a greater role in meeting the increased needs of the industry in the context of cotton shortage and ever-rising costs of all inputs. The chairman informed the members that a demonstration unit of the BTRA electrolytic process had been set up in West Germany, and that foreign companies had shown interest. Work had been started on two projects relating to flame retardant finishing and solvent scouring, the projects being sponsored by the Union Ministry of Commerce, he said.

Shri Ruia highlighted the major contributions in mechanical processing that had contributed to an increase in spindle speed, improvement in yarn appearance and better weavability, and spoke appreciatively of the achievements of the maintenance audit activities in spinning and weaving. He further enumerated the gains by the industry in cost reduction as a result of BTRA's studies.

He also stated that BTRA had been able to develop and effectively transmit a wide range of expertise for the benefit of industry, and mentioned the release of free know-how on five processes in addition to 18 released earlier.

Shri Ruia distributed merit certificates and cash awards to 16 BTRA scientists for outstanding work.

An exhibition of research developments by BTRA, arranged on the occasion, displayed 35 exhibits covering mechanical processing, chemical processing, engineering and instrumentation. Some of the important exhibits included were : BTRA spindle topping apparatus, which brings considerable saving in spindle oil consumption; a process for reuse of spindle oil; a hot mercerization process and a rapid bleach process for cost reduction in bleaching; a low-cost process to give two-tone effect on polyester fabrics; an electrolytic process for vat dyeing; PEP unit for increasing efficiency of the autoconer; electronic digital stretchmeter; fibre bundle strength tester based on a new transducer system; top roller pressure gauge; and a gear run-out tester.

Hydrocarbon Vapour Detector Tube

NRDC Award-winning Invention

The hydrocarbon vapour detector tube developed by Shri A. Bagchi of the Central Mining Research Station (CMRS), Dhanbad, is now under commercial exploitation. The tube has found wide application for quick and at the same time on-the-spot detection and estimation of the hydrocarbon content in the vapour of high boiling (50-200°C) petroleum products as encountered in oil tankers, fuel-oil tanks of ships, and aviation and petroleum industries. Indian naval services have already started using it.

It is a glass tube of definite size, packed with a reacting medium and sealed at both ends. At the time of use both the sealed ends are broken and 200 cc of air-vapour mixture is sucked through the tube in about 3 min. either by a bulb-type hand-squeeze aspirator or any other suitable device. On reaction with the hydrocarbon, the reacting medium changes colour from orange to green. The decolourized length is proportional to the concentration of hydrocarbon in the atmosphere and the concentration C is given by $C = \frac{1}{2}(L + 1)$, where C is the concentration in mg/litre, and L is the green coloured length in mm.

To meet the demand of the country, a similar type of tube was being im-

Shri A. Bagchi has been awarded for the Independence Day (1977) award of the National Research Development Corporation of India [*CSIR News*, 27 (1977), 130].

Food Science & Technology
Information Service
31 AUG 1978
C.F.T.R.I., MYSORE

ported. The tube developed at CMRS is sensitive enough to detect and estimate hydrocarbon concentrations far below its threshold limit.

An ordinary tube of 3 mm internal diameter and length of up to 3 m can be used along with the aspirator as extension to the detector tube for measuring hydrocarbon concentrations in inaccessible zones. It is cheaper than the imported variety and can be used for up to two years from the date of its manufacture.

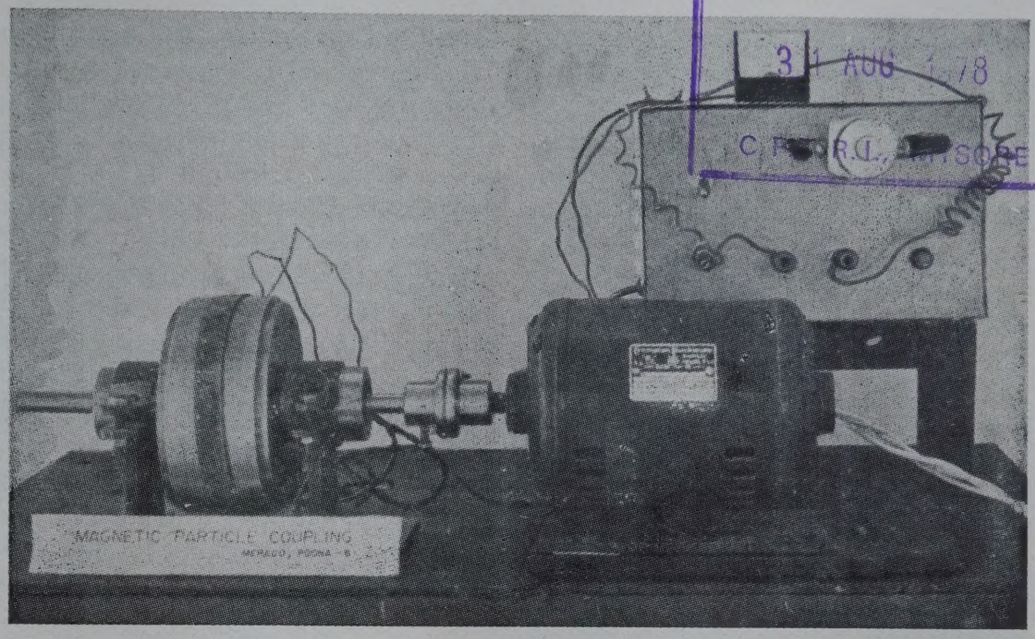
Magnetic Particle Clutch

NRDC Award-winning Invention

A magnetic particle clutch has been designed and developed by Dr S. K. Basu of the Central Mechanical Engineering Research Institute, Durgapur, and Dr H. Bagchi of the Mechanical Engineering Research and Development Organisation (MERADO), Poona, for industrial feed drives with a unique means of torque control. A prototype of the clutch has been tested successfully.

The coupling contains two rotors, input and output, having an annular gap in between partly filled with a ferromagnetic material. Around the rotors there is a stationary coil which acts as the source of excitation of the ferromagnetic powder. The degree of excitation may be varied by sending different magnitudes of current to the coil. When current is applied, magnetic flux passes through the powder and the particles get attracted between the pole faces in such a way that a torque proportional to the degree of excitation is transmitted to the output rotor.

The coupling operates at 950 rpm with a torque load of 12,000 g cm approximately. The electric source required is 60 V dc. The weight of the unit is 5 kg, powder content about 8 g, minimum excitation current 500 mA, and maximum rated current 3800 mA.



Magnetic particle clutch developed at MERADO, Poona

The clutch can be used in machine tool feed drive mechanism, tension control of threads in textile machinery, tension control in the manufacture of capacitors, and torque limiter in plastic moulding machine.

The special features of the present design are : negligible wear, no slip, coupling in both directions, no slip rings needed, and minimum cost in maintenance and upkeep.

The raw materials needed for manufacturing the product are mild steel, bearing, annealed copper wire, commercial aluminium and ferromagnetic powder. The machinery and equipment required are precision lathe, drilling machine, milling machine and fitter kit. All these are available indigenously. A few quality control facilities are also required, viz. coil testing requiring simple instrumentation kit, torque testing requiring torque, and speed testing requiring tachometer.

The estimated annual demand for the equipment is about 100 units which is likely to go up to 400 units in the near future.

Synthesis of Potential Antifertility Agents

A project aimed at the synthesis of some potential antifertility agents was taken up by Shri Susheel Durani at the Central Drug Research Institute (CDRI), Lucknow. Shri Durani worked under the guidance of Dr Nitya Nand, Director of CDRI.

Durani tried synthetic approaches to 13,14-secoestradiol and 8, 9-13, 14-disecoestradiol. These compounds were required for evaluation as anti-implantation agents, and more specifically, as a suitable molecular pattern to investigate the mechanism of post-coital antifertility action of nonsteroidal estrogens. The synthesis of these compounds, incorporating medium sized carbocyclic rings, posed some problems. Certain key intermediates for the synthesis of these compounds were prepared via a novel acid catalyzed rearrangement of a 6-methoxy-1-tetralone molecule, carrying an appropriate side chain at its 2- position. Mechanistic details of this reaction were investigated.

There is considerable interest in novel synthetic approaches to estrone, which forms an important starting material for the preparation of various clinically important estrogens and progesterones. Because of the superior stereochemical control in steroidal synthesis via biogenetically patterned polyolefin cyclizations, Durani made an attempt to synthesize estrone by this method and synthesized a suitable

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Drs S. K. Basu and H. Bagchi have been awarded the Independence Day (1977) award of the National Research Development Corporation of India [*CSIR News*, 27 (1977), 130].

long-chain diolefin acid chloride. Preliminary experiments were directed to force a cyclization of this molecule.

Shri Durani has been awarded Ph.D. degree of the Jammu University for his thesis based on these studies.

Current Awareness Course on Metal Cutting

The Visvesvaraya Industrial and Technological Museum (VITM), Bangalore, organized, in collaboration with the Rotary Club of Bangalore (North) and Institution of Engineers, a three-day current awareness course on metal cutting for industrial workers from 25 to 27 July 1977. The course was supplemented with an exhibition on the historical growth of metal cutting machines and tools and visits to industrial establishments having the latest machines. Nearly 160 industrial workers from the various industrial establishments at Bangalore underwent this course.

A seminar was also held on the occasion to identify the areas in which such courses could be organized. It was attended by industrialists and educationists.

PROGRESS REPORTS

NIO Annual Report : 1975

The annual report of the National Institute of Oceanography (NIO), Goa, for 1975, published recently, shows that the institute investigated 18 projects with emphasis on coastal zone management, physical processes, air-sea interaction, extraction of active compounds from seaweeds, exploration of mineral resources, aquaculture, oceanographic instrumentation, and data processing.

The first phase of the United Nations Environment Programme on marine pollution monitoring and marine living resources assessment for the Indian Ocean region was initiated. Ten sampling stations were established along the west coast of India for observations on the pilot project on monitoring of oil pollution under the framework of the Integrated Global Ocean Station System. Regular sampling and monitoring of tar ball deposits along the west cost were continuing. Observations on oil spills in the open sea are being carried out by the Shipping Corporation of India and Scindia Steam Navigation Co. Ltd.

Sponsored projects undertaken by NIO include : Surveys for Zuari Agro-Chemicals proposed effluent pipeline route in the Cola Bay, Goa; Model studies of Mandovi Zuari estuaries and Cumbarjua Canal; Hydrographic studies in the inner harbour of Cochin Port; Determination of suitable points in the sea off Mangalore for the discharge of treated waste material for pollution control off Karwar; Oceanographic survey of Narara Bet in the Gulf of Kutch; and Contract sorting of zooplankton.

Under a project on physical processes occurring in the seas around India, data collected during Indo-Soviet Monsoon Experiment (1973) and *Darshak* Oceanographic Expedition (1973-74) were analyzed. Studies on the light penetration in the coastal waters and littoral drift and nearshore circulation along Goa coast were also carried out.

The investigations relating to chemical oceanography were carried out on : (i) inter-relationships of organic and inorganic constituents of estuarine and inshore waters around Goa and the coastal, offshore and deep sea regions of the northern Arabian Sea; (ii) chemistry of pharmacologically active components of marine plants and animals; (iii) pollution problems; and (iv) improvement of efficiency of solar desalination stills.

Geological and geophysical surveys were carried out to assess the petroleum and mineral prospects of the western continental margin of India. The sedimentological and palaeontological studies on the seas around India were also carried out. Seventy sediment samples were analyzed for organic matter and foraminiferal diversity. It was found that rotalid and miliolid foraminifera dominated in the beach and water-tidal zone, whereas in the polluted region, rotalids decreased with the increase in miliolids and species like *Trochamina*, *Nonionella* and *Bucella*. Because of altered environmental conditions, rotalids and miliolids showed vesicles in their chambers, discolouration due to fillings and decalcification of their ornamentation.

Studies were carried out on the aquaculture in the waters of Goa and Cochin. Laboratory and field studies were carried out on the bioenergetics of some marine and estuarine forms. Biogeography of the zooplankton in the Indian Ocean was studied with regard to the systematics and zoogeography and ecology of zooplankton, and environmental preference, species association, abundance and diversity.

The new instruments developed at NIO are : tide and wave recorder and counter, operational depth meter, and a conductivity type salinometer. The salinometer can read salinity directly, has a range of 0-38%, and a sensitivity of $\pm$ 0.05%.

Eighty-one research papers were published during the year.

CSSTD Report : 1974-76

The Centre for the Study of Science, Technology and Development (CSSTD) has brought out its first report for the period 1974-76. Though formally established in August 1973, the centre started functioning as a part of the Planning Division at the CSIR Headquarters in 1974.

The centre has been engaged in multifarious activities which include : (1) organization of national and international seminars on topics relating to its major areas of study, viz. technology assessment and alternative technologies; planning of science and technology; dynamics of science, technology and society; and scientific and technical manpower; (2) consultancy work; (3) planning and execution of research programmes; (4) collection, dissemination and documentation of all publications relevant to the activities of the centre; (5) arrangement of lectures by scholars visiting the centre; and (6)

publication of reports arising from the activities of the centre.

During the period, a national seminar on 'Alternative Technologies' and an international seminar on 'Management of R & D Institutions' were organized.

In order to promote and popularize Science Policy Information Exchange System (SPINES) among the developing countries, the centre organized the first prototype workshop on SPINES with the collaboration of Unesco and the Indian National Scientific Documentation Centre, New Delhi. The Department of Science and Technology has appointed the centre as the national input centre to SPINES under its NISSAT programme.

Under the collaborative scheme, the centre has cooperated with organizations as well as individuals in four projects : (1) Towards self-reliance : problems of technological development—a case study of the drugs and pharmaceuticals industry in India; (2) The nature and role of aid to developing countries in science policy and technical research—a joint Indo-Hungarian study; (3) Values and attitudes of science-trained working women in Bombay; and (4) Analysis of methodology applied to generate technologies for the rural areas of the developing countries.

Under the visiting fellowship scheme two projects have been completed; these are : (1) Scientific manpower in national research and development institutes; and (2) The energy resources development in India. A project on 'Some alternative approaches to rural development involving organization, science and technology' was in progress.

Projects of research fellows which were in progress at the centre include : (1) The role of parliament in the evolution of science policy in India; (2) Project selection in R & D; (3) Criteria of working out priorities at CSIR—measurement and adequacy aspects; (4) Impact of British colonial and imperial interests on the growth of Indian science and industry; (5) Social implications of technological innovations : a case study of Karimnagar project; and (6) Resource allocation in CSIR R&D.

A bibliography on 'Science Policy Studies in India 1967-74' was published. A report on the pattern and role of oral communication in R & D was prepared.

Preparation of reports of various countries on their S & T policies, structure of R&D institutions, financing of R&D, educational facilities, manpower potentials, their trade and economic ties with India and other related topics was taken up. Detailed country reports were prepared in respect of Japan, Czechoslovakia, Hungary, Poland and GDR. Short country reports on Iran, Turkey, Austria, Mexico and Nigeria were also prepared. The centre also prepared a country report on India for Unesco.

As many as 26 scholars visited the centre and delivered lectures. Twenty-one research papers/articles were published during the period.

CSIR SUPPORT TO RESEARCH

New Schemes

Mutagenicity Testing of Some Widely Used Pesticides

The problem of screening pesticides for their mutagenicity is comparatively new and needs immediate attention because of their liberal use by farmers. The mechanisms by which most pesticides kill, inhibit growth, or sterilize the various animal and plant pests for which they are designed are thought to be unrelated to genetic mechanisms. Nevertheless, the ignorance of chemical mutagenicity will not lead us to the assumption that pesticides are safe without specific mutagenic tests. Some work has been done in this context but it has been of purely cytological nature. Besides, it is well known that there is no proof that cytogenetic abnormalities are an absolute indication of mutation.

Under a new CSIR scheme granted to Dr S. P. Sinha of Zoology Department, Bhagalpur University, Bhagalpur, it is proposed to study the mutagenicity, if any, of certain widely used pesticides belonging to organophosphorous, organochlorinous and organometallic groups.

The fruit fly *Drosophila melanogaster* will be used as test object on which a considerable number of simple, rapid and economical tests for detection of mutation are possible. The pesticides will be mixed (in varied dosage, including the one used in agriculture) with food to raise the larvae. The test for mutagenicity will be done using the frequency of the following parameters in control and treated variants of the flies scored in M_1, M_2 and M_3 generations: (i) sex-linked recessive lethal mutation with the help of laboratory stocks like Muller-5; (ii) chromosome breakage and translocation with the help of two-generation reciprocal translocation test; (iii) loss of X-chromosome and appearance and detection of sex-linked viable mutation with the help of attached XX stock; (iv) autosome-linked recessive lethal mutations with the help of Curly-Lobe laboratory stock; and (v) dominant lethal mutation by counting the number of eggs from which larva could not hatch.

Identification and Optimal Control of Power Systems

In a new CSIR research project granted to Dr P. S. R. Murty and Shri P. V. Ramana Rao of the Electrical Engineering Department, Regional Engineering College, Warangal, it is proposed to investigate the factors leading to optimal control of power systems.

Parameter identification, which is an essential prerequisite for analysis and control of any dynamic system, will be applied in this project to power system elements. Dynamic models of components like boilers, turbo-alternator sets, nuclear reactors and heat

exchangers are required for determining the optimal control strategy for satisfactory operation of large interconnected power systems. Boiler controllers, load frequency controllers, and controllers at nuclear power plants require simulated models for dynamic representation of the system or plants in computerized programmes for either on-line or off-line control. The proposed work will develop programmes for off-line and on-line identification of parameters. Feasible programmes will also be developed for optimal control with digital computers using the identified parameters. This work will be of extreme use to the power industry when the national grid grows into its full stature.

The work is planned to be completed in two years' time with only software considerations. Identification and control will be applied to steam and hydropower stations during the first year and it will be extended to heat exchangers during the second year.

The various computational difficulties that may arise in the application of the 'theory of system identification and control' from available practical data will be studied and an attempt will be made to suggest means for overcoming them for future implementation.

Toxicity and Pollution Effects of Industrial Wastes on Aquatic Life

In the western districts of Uttar Pradesh, where there are many big and small industrial units, the industrial wastes are mainly disposed of, without treatment, into the rivers, which are the main source of fishes. Under a new CSIR scheme sanctioned to Dr R. C. Dalela, Head, and Dr S. R. Verma, Senior Lecturer, Zoology Department, D.A.V. College, Muzaffarnagar, attempts will be made to evaluate the intensity of pollution due to the industrial wastes discharged into the rivers of western U.P. and their effects on aquatic life, particularly fishes.

Preliminary studies have indicated that industrial pollution has created a critical condition in the rivers like Hindan, Krishna and Ganga. Further studies proposed are : survey and characterization of industrial waste and river water; bioassay of different wastes; and working out the effects of pollution on fishes by these industrial wastes. Histopathological, histochemical and biochemical methods will be used. The degeneracy, alteration in enzyme system and organic components in the different tissues of the fishes will be studied in detail. This will provide a clear picture of the cumulative and detrimental effect of these wastes.

Absorptive Functions of Small Intestine in Protein-Calorie Malnutrition in Albino Rats

The protein-calorie malnutrition (PCM) in children is one of the major illnesses afflicting the population in India. It is now well established that this disease is accompanied by distinct morphological and functional alterations in the small intestine of man; it could also be produced in experimental models. The central cause for such alteration appears to be the altered rate of cellular mitotic activity at the basal cells of crypts of Lieberkuhn.

The intestinal mucosa presents itself as the first line of defence in the homeostatic regulatory mechanisms by virtue of its different absorptive functions with respect to the various nutrients. Thus any alteration in the morphology and the function of mucosal population will ultimately reflect a disordered absorptive pattern of different nutrients. The PCM illustrates one such example of the disorder of the small intestine.

It has also been observed that an antimitotic drug, vinblastin sulphate, when injected intraperitoneally to the experimental animals, produces intestinal mucosal lesions to a degree apparently similar to that observed in the state of PCM. Such drug-induced altered mucosal cell population is also accompanied with defective absorption of nutrients.

The production of new cells at the bottom of crypts and exfoliation of cells at the tip of villi are independent events. It is, therefore, doubtful whether the deformities observed in the state of PCM and those by the antimitotic drug are consequent to the morphological alterations of the intestine. The functional capacities of the absorptive cells also suffer in these situations. The biochemical correlates of the morphological disorders of the intestines are also to be looked into.

Under a new CSIR scheme granted to Dr J. Nagchaudhuri, Professor and Head, Department of Physiology, Institute of Medical Sciences, Banaras Hindu University, Varanasi, the absorptive functions of intestinal mucosa would be studied with a view to unravelling the peculiarities of complex absorption/transport mechanisms of intestinal mucosal cells. The linking of the biochemical correlates, like enzymes, in this process would also be brought to light. These experiments would not only bring out developments of the functional apparatus of the cell with morphogenesis but also would throw light on the clinical cases of malnutrition (PCM) in children, thus helping ultimately in better management and treatment of such patients.

Cellulose from Thermophilic Actinomycetes

Under a new CSIR scheme granted to him, Dr S. A. Dhala, Department of Microbiology, Bhavan's College, Bombay, proposes to screen newly isolated thermophilic actinomycetes and those from his stock collection for cellulose production, biomass and protein contents. Cultures having high protein yields and desirable amino acid composition will be adopted to growth in agricultural and industrial wastes, like molasses, bagasse and distillery wastes. Studies in characterization and purification of the enzymes will also be undertaken by

the use of Sephadex gel, ion exchange chromatography, electrophoresis, etc. Attempts will be made towards immobilization of enzymes and to obtain proteins from the biomass in a dry powder form. This investigation may give thermophilic enzymes which are more suited for the utilization of waste and application in industry in tropical climates. Fermentation of cellulosic wastes will also, to a certain extent, help in abatement of environmental pollution.

PERSONNEL NEWS

Appointments/Promotions

Shri A. K. Chakravarti

Shri Arun K. Chakravarti, head of the Fine Coal and Formed Coke Division of the Central Fuel Research Institute (CFRI), Dhanbad, has been promoted from Scientist EI to Scientist EII with effect from 17 December 1975.

Shri Chakravarti (born 1927) obtainned his B.Sc. degree from the University of Calcutta in 1947 and B.Ch.E. from the Jadavpur University in 1951. Joining the Coal Preparation Division of CFRI in 1952, Shri Chakravarti took up research and development on various aspects of the growing coal preparation work and assisted in the planning and projection of a number of public sector coal washing plants in the country.

Shri Chakravarti has worked on a number of processes related to coal preparation and formed coke-making, which include oleoflotation (for upgrading and dewatering of small coal), pellet coke, briquetted fuels, smokeless igniting fuels, improved charge for ferro-alloy and ferro-silicon production, sponge iron production from iron ore, devel pment of indigenous flotation reagents and pneumatic separation equipment. He is now engaged in developing formed coke manufacture for domestic, industrial and metallurgical uses, utilizing low-rank non-coking coals, low-grade coaking coals and washery byproducts. Based on the processes developed by him, commercial plants for manufacture of formed coke and pellet coke have come up.

In 1959, Shri Chakravarti received training in coal washing in various plants of the National Coal Board, UK, under Technical Cooperation Scheme of Colombo Plan and visited France, Belgium and Holland to study the working of cyclone coal washing installations. As a member of Government of India delegation on coal, he went to USSR and Poland in 1962 to finalize technical specifications of Kathara and Gidi Coal Washeries (Hazaribagh district of Bihar) and in 1966 visited Poland again under the Indo-Polish Cultural Exchange Programme to be apprised of further development in coal preparation techniques.

Shri Chakravarti received, in 1971, the ninth National Metallurgists' Day award for outstanding work on metallurgical fuels development. In 1972, he was awarded a silver medal for his paper 'Selective preparation of coal using pneumatic separation' by the Coke Oven Managers' Association, UK (Indian Section).

Shri Chakravarti has published more than 60 research and review papers and has a number of patents to his credit in India and abroad.

Dr D. S. Bhakuni

Dr Dewan S. Bhakuni, Scientist C, Central Drug Research Institute (CDRI), Lucknow, has been promoted to Scientist EI with effect from 29 July 1977.

Dr Bhakuni (born 30 Dec. 1930) obtained his M.Sc in chemistry (1954) and D Phil. (1957) from the Allahabad University. He joined CDRI in 1958 and moved to the National Botanic Gardens, Lucknow, in 1960. Proceeding to UK in 1962, Bhakuni worked with Sir Derek Barton, F.R.S., Nobel Laureate, at the Imperial College of Science and Technology, London, and obtained his Ph.D. and D.I.C. degrees. Returning to India in 1965 he again joined CDRI. He was visiting professor during 1972-73 at the University of Concepcion, Chile, South America.

With his main interest in natural products, he has worked on alkaloids, anthraquinones, naphthaquinones, glycosides, phenolic compounds, terpenoids, carbohydrates, fats and oils. He has systematically examined a large number of indigenous medicinal plants and isolated several biologically active compounds from them. His studies have uncovered biological activity in a number of new natural products. He has achieved biogenetic type of syntheses of some morphine, proaporphine and aporphine alkaloids. He has also examined a number of marine plants and animals for biodynamic substances.

Dr Bhakuni has been one of the pioneers in the country in the field of alkaloid biosynthesis. With the help of tracer technique he has uncovered the biologically active proaporphine, aporphine, benzylisoquinoline, bisbenzylisoquinoline and abnormal *Erythrina* alkaloids. Using radio and optically active precursors he has studied the stereospecificity of enzymatic reactions.

Dr Bhakuni is member of the British Chemical Society and the Chemical Society of Chile. He is a Fellow of the Indian Chemical Society. He has participated in a number of national and international conferences. He is the recipient of the 1975 Shanti Swarup Bhatnagar prize in chemical sciences.

Dr Bhakuni has to his credit about 100 research papers and a number of reviews.

Dr M. Poddar

Dr M. Poddar has been appointed Scientist EI at the National Geophysical Research Institute (NGRI), Hyderabad, with effect from 6 June 1977. Dr Poddar (born 1939) obtained his B. Sc. (Hons) from the Calcutta University (1959) and M. Tech. (1962) and Ph.D. (1967) from the Indian Institute of Technology (IIT), Kharagpur. He started his career as a Burmah-Shell Research Fellow and later became a senior research investigator in IIT, Kharagpur. He Joined Indian School of Mines (ISM), Dhanbad, in 1966 as a lecturer, and was promoted as assistant professor under

UGC's promotion scheme in recognition of his outstanding work.

Dr Poddar visited UK from July to October 1975 under the Younger Scientists Exchange Scheme to study geomagnetic depth-sounding technique at the University of Lancaster.

At ISM, he was instrumental in establishing a laboratory in which experimental investigations of problems relating to exploration geophysics including small scale model studies were undertaken by postgraduate and research students. His contributions in the field of electromagnetic model studies and development of interpretation techniques for electromagnetic anomalies, based on these studies, in a complex ore environment are recognized internationally. He has been a recipient of grant-in-aid by the Electronics Commission for an R&D project on development of a multi-frequency electromagnetie prospecting equipment.

At NGRI Dr Poddar will lead a group of scientists in developing new and more effective techniques for mineral exploration under a project supported by the United Nations Development Programme.

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Dr T. N. Gowd of NGRI, Hyderabad, has been promoted from Scientist B to Scientist C (23 Aug. 1977).

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The following personnel have been appointed/promoted at NGRI, Dr K.M. Tripathi (as Scientist C; 18 May 1977); Shri Saurabh Kumar Varma (as Scientist C; 5 July 1977); Shri B.S.P. Sarma (as Scientist B; 28 July 1977); and Dr E. Veerakumar (as Resident Medical Officer; 27 June 1977).

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Consequent on assessment, the following personnel of the National Chemical Laboratory, Poona, have been promoted :

As Scientist EI

Dr A.S. Rao (23 July 1974); Dr S.C. Sethi (10 May 1975); Dr T.R. Ingle (24 June 1975); Dr R.M. Joshi (1 April 1976); Shri S.P. Mukherjee (4 April 1976); and Dr S.N. Kulkarni (18 Dec. 1976).

As Scientist C

Dr K.G. Gore (22 April 1976); Dr R.S. Joshi (23 Aug. 1976); Dr B.A. Nagasampagi (28 Aug. 1976); Dr A.F. Mascarenhas (22 Sep. 1976); Shri N. Rajagopalan (1 Jan. 1977); Dr R. Rama Rao (1 Jan. 1977); and Shri S.R. Srinivasan (1 Jan. 1977).

As Scientist B

Dr V.K. Hinge (22 July 1975); Shri R.N. Shukla (1 May 1976); Shri S.G. Patil (11 May 1976); Shri K.N. Dixit (27 May 1976); Shri Kasturi Rangachar (27 May 1976); Shri Sankar Ghosh (2 June 1976); Shri R.N. Paul (9 June 1976); Dr (Mrs) S.A. Patwardhan (8 Aug. 1976); Dr S.P. Vernekar (9 Dec. 1976); and Dr C.A. Chinchwadkar (10 Dec. 1976).

As Scientist BI

Shri K.B. Chorgi (17 April 1975); Shri I.R. Unni (27 May 1976).

As Scientist A

Shri I. Balakrishnan (24 Feb. 1976); Shri K.C. Brahme (24 Feb. 1976); Shri C.E. Deshpande (24 Feb. 1976); Shri K.G. Deshpande (24 Feb. 1976); Dr C.S. Dorai (24 Feb. 1976); Shri S.R. Harisangam (24 Feb. 1976); Shri H.S. Jagtap (24 Feb. 1976); Shri C.J. Johny (24 Feb. 1976); Mrs H.V. Kamath (24 Feb. 1976); Shri R.S. Karnik (24 Feb. 1976); Shri S.T. Kshirsagar (24 Feb. 1976); Shri R.B. Malwankar (24 Feb. 1976); Dr A.R. Mehendale (24 Feb. 1976); Shri P.P. Moghe (24 Feb. 1976); Dr V.B. Patil (24 Feb. 1976); Dr V.J. Rao (24 Feb. 1976); Dr S.D. Sathaye (24 Feb. 1976); Mrs D. Srivastava (24 Feb. 1976); Dr A.S. Vaidya (24 Feb. 1976); Dr M.P. Kulkarni (24 March 1976); Shri K.S. Balaraman (16 April 1976); Shri V.K. Bhalerao (11 May 1976); Shri S.S. Ramdasi (25 May 1976); Dr S.K. Kamat (9 June 1976); Dr Harish Narain (5 July 1976); Dr V.G. Gunjikar (3 Aug. 1976); Shri B.M. Dubhash (8 Aug. 1976); and Dr S.S. Mahajan (19 Oct. 1976).

As Scientist AI

Shri R.K. Dhingra (24 Feb. 1976); Shri M.B. Kakade (24 Feb. 1976); Mrs B.D. Kochhar (24 Feb. 1976); and Shri R.A. Modak (11 May 1976).

CSIR Publications Win National Awards

Two CSIR publications have won the 19th National Awards for excellence in printing, designing and production.

The *NML Technical Journal*, published by the National Metallurgical Laboratory (NML), Jamshedpur, won the award (second prize) under the category 'Monthly and other magazines—English'. Another second prize has been awarded to *Science-ki-Duniya*, an Urdu science journal published by the Indian Languages Unit of CSIR.

These awards are given by the Directorate of Advertising and Visual Publicity, Ministry of Information and Broadcasting, Government of India.

Leather Week and Tanners' Get-together

The Central Leather Research Institute (CLRI), Madras, will be organizing the 'Leather Week' and the thirteenth Tanners' Get-together from 31 January to 6 February 1978. The get-together will be devoted to discussions on the status of the technology, recent developments, and gaps in the science and technology of leather auxiliaries in the present context of leather industry's requirements, and will be held in three sessions.

The dateline for receipt of completed registration forms and abstracts of papers to be presented at the get-together is 31 October 1977 and that for the receipt of full papers, 30 November 1977. Further details can be had from the Conveners, Thirteenth Tanners' Get-together 1978, Central Leather Research Institute, Adyar, Madras 600020.

Printed & Published by Y. R. Chadha Chief Editor. Publications & Information Directorate (CSIR), Hillside Road, New Delhi 110012, at Leipzig Press. D-52, South Extension Part 1, New Delhi 110049
Editorial Staff : P. S. Shankar, D. C. Goswami, S. K. Rastogi & B. C. Kashyap

RN 4212/5